

REMARKS

Overview of the Office Action

The abstract has been objected to as including legal phraseology.

Claims 12, 16, 21, 32, and 34 have been objected to for various informalities.

Claims 14 and 37 have been rejected under 35 U.S.C. §112, second paragraph, as indefinite.

Claims 1-7, 9, 17-25, 27, 36, and 37 have been rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 7,126,918 (“Roberts”).

Claims 10-14, 16, 28-32, and 34 have been rejected under 35 U.S.C. §103(a) as unpatentable over Roberts in view of U.S. Patent Pub. No. 2004/0151197 (“Hui”).

Claims 15 and 33 have been rejected under 35 U.S.C. §103(a) as unpatentable over Roberts in view of Hui, and further in view of U.S. Patent Pub. No. 2003/0014180 (“Myr”).

Claim 35 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Roberts in view of U.S. Patent No. 6,643,256 (“Shimojo”).

Claims 8 and 26 have been found to contain allowable subject matter, and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Status of the claims

Claims 1-37 have been amended.

Claims 38-39 have been newly added

Claims 1-39 are now pending.

Allowable subject matter

The Office Action indicates that claims 8 and 26 have been found to contain allowable subject matter, and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 38 and 39 have been newly added. Newly added claim 38 includes the subject matter of original independent claim 1, the subject matter of original claim 2, and the allowable subject matter of original claim 8. Therefore, claim 38 is allowable. Newly added claim 39 includes the subject matter of original independent claim 19, the subject matter of original claim 20, the subject matter of original claim 21, and the allowable subject matter of original claim 26. Therefore, claim 39 is allowable.

Objection to the abstract

The abstract has been amended to remove all legal phraseology therefrom. Applicants submit that the Examiner's objection has thus been overcome.

Objection to claims 12, 16, 21, 32 and 34

The Office Action states claim 12 has been objected to for using the phrase “adapted to”. Claim 12 has been amended to remove this phrase.

The Office Action states that claims 16 and 34 include the phrase “or not”. Claims 16 and 34 have been amended to remove the phrase “or not”.

The Office Action states that the limitation “the means for controlling admission of data” recited in claim 21 lacks proper antecedent basis. Claim 21 has been amended to provide antecedent basis.

The Office Action states that the phrase “congestion measurement” in claim 32 should be recited in the form of a step. Claim 32 has been amended to recite a method step.

Applicants submit that these objections have now been overcome.

Rejection of claims 14 and 37 under 35 U.S.C. §112, second paragraph

The Office Action states that claim 14 has been rejected because no function of the "means" is specified. Claim 14 has been amended to recite a function.

The Office Action states that the elements “flow identifier” and “free portion” recited in claim 37 lack sufficient antecedent basis. Claim 37 has been amended to provide antecedent basis for the recited elements.

Applicants submit that these rejections have now been overcome.

Claims 1-7, 9, 17-25, 27, 36 and 37 are allowable over Roberts under 35 U.S.C. §102(e)

The Office Action states that Roberts teaches all of Applicants’ recited elements. Independent claim 1 has now been amended to recite: “A device for processing packets of flows on a network link and ensuring a quality of service without explicitly distinguishing between real-time flows and data flows, the device comprising: scheduling means for scheduling packets in a queue in accordance with a fair queuing with priority algorithm; wherein a priority is assigned to the packets of the flows for which a bit rate is below a dynamic threshold, the dynamic threshold being determined by traffic conditions.” Support for the claim amendment can be found in paragraphs [0061], [0068], [0069], [0080], and [0105] of Applicants’ published specification.

Roberts fails to teach or suggest “A device for processing packets of flows on a network link and ensuring a quality of service without explicitly distinguishing between real-time flows and data flows”, and “wherein a priority is assigned to the packets of the flows for which a bit rate is below a dynamic threshold, the dynamic threshold being determined by traffic conditions”, as recited in Applicants’ amended independent claim 1.

In the method disclosed by Roberts, micro-flow packets are explicitly differentiated based on the class of service that is associated with each micro-flow.

Roberts discloses that a micro-flow is a group of IP data packets, wherein each packet includes a label field (305) that allows the network (200) to differentiate the data packets of one micro-flow from the data packets of another micro-flow (see col. 8, lines 36-39 and Fig. 3A of Roberts). A label field (305) of each Roberts data packet contains a uniquely identifiable set of variables such as a protocol type, source/destination address, TCP/UDP source/destination port numbers, and Diffserv identifiers (see col. 8, lines 41-58 of Roberts).

The quality of service (QoS) constraints or requirements of each micro-flow are defined by a set of quantified QoS descriptors that are stored in a QoS field (310) which is embedded in the first micro-flow data packet of each micro-flow (see Fig. 3A of Roberts). The label field (305) of the Roberts packet also associates each micro-flow data packet with the quantified QoS descriptors (see col. 8, lines 39-41 of Roberts). The set of QoS descriptors of Roberts may include packet discard time limit (D), a weighting factor for the available rate (W), a guaranteed rate (GR), a micro-flow timeout period (DT), an available rate (AR), and a delay variation value (Q). Based upon these QoS descriptors, the behavior of the micro-flow can be characterized as one of three types of service, i.e. available rate (AR) traffic, maximum rate (MR) traffic, or guaranteed rate (GR) traffic (see col. 8 line 59 to col. 9, line 5 of Roberts).

Thus, in accordance with the teachings of Roberts, a specific and quantified QoS level is associated with each micro-flow by associating a specific set of QoS descriptors with the packet-stored set of variables that uniquely identifies that micro-flow. The setting of QoS descriptors in Roberts is therefore equivalent to defining and identifying a class of service for each micro-flow. Data flow priority is determined by identifying the class of service of a particular data flow.

In contrast to Roberts, Applicants' claimed invention uses a fair queuing with priority scheduling algorithm to distinguish implicitly between real-time flows and data flows, ensuring that real-time flows have a low delay per packet. Further, Applicants' claimed invention combines implicit admission control for each flow and fair queuing with priority scheduling to ensure quality of service without the need to or, in fact, explicitly distinguishing between real-time flows and data flows (see paragraphs [0082], [0083], and [0105] of Applicants' published specification).

Applicants' claimed device and method employ admission control for controlling admission of the flows in accordance with admission criteria. As shown in Applicants' Fig. 2, a routing module (24) performs admission control with respect to packets (20) of incoming flows. The module 24 consults and keeps up to date a list of protected flows which are flows admitted by the routing module (24) and active (i.e. a new packet of the flow has been identified within a certain time interval). A scheduling module (28) manages the queue of packets in accordance with a fair queuing with priority algorithm. In Applicants' algorithm, priority is assigned to packets of flows whose bit rates do not exceed the threshold corresponding to the current fair bit rate. This condition is embodied in the values of certain parameters of the fair queuing algorithm employed. Packets of a flow whose incoming bit rate exceeds the fair bit rate are classified as non-priority packets. Applicants' algorithm also regulates the peak bit rate of real-time flows, as

incoming flows (20) whose bit rates are too high are identified by the scheduling module (28) and downgraded or deemed non-priority flows. Thus, Applicants' invention eliminates the need for module (4) to police the peak bit rate of the real-time flows shown in Applicants' Fig. 1. Consequently, Applicants' recited invention implicitly distinguishes between real-time flows and data flows and does not require explicitly distinguishing between real-time flows and data flows as the basis for queuing.

Roberts accordingly fails to teach or suggest "A device for processing packets of flows on a network link and ensuring a quality of service without explicitly distinguishing between real-time flows and data flows", as recited in Applicants' amended independent claim 1.

Further, Roberts teaches that if the IP data packets for a specific micro-flow are received at a rate that exceeds the guaranteed rate (GR) or the available rate (AR) assigned to the micro-flow, the policing scheduler (540) discards the micro-flow data packet (see col. 15, lines 46-57 and Fig. 6 of Roberts). As previously described above, the guaranteed rate (GR) and the available rate (AR) are only assigned after the flow has been explicitly differentiated and the quantified QoS descriptors associated with the micro-flow. Thus, the guaranteed rate (GR) and available rate (AR) of Roberts depend on the level of service explicitly associated with the micro-flow at the outset.

In contrast to Roberts, Applicants' dynamic threshold is variably determined by traffic conditions and such as the current fair bit rate achieved by the chosen form of scheduling (see paragraphs [0069], [0080], and [0099] of Applicants' published specification). As the fair bit rate changes, the threshold also changes.

Roberts, therefore, also fails to teach or suggest, “wherein a priority is assigned to the packets of the flows for which a bit rate is below a dynamic threshold, the dynamic threshold being determined by traffic conditions”, as recited in Applicants’ amended independent claim 1.

Independent claim 19 has been amended to recite limitations similar to those present in claim 1 and is, therefore, also patentable over Roberts for the reasons discussed above with respect to claim 1.

In view of the foregoing, Applicants submit that Roberts does not teach or suggest the subject matter recited in amended independent claims 1 and 19. Accordingly, claims 1 and 19 are patentable over Roberts under 35 U.S.C. §102(e).

Dependent claims

Claims 2-7, 9, 17-18, 20-25, 27, 36 and 37, which depend from independent claims 1 and 19, incorporate all of the limitations of the respective independent claim and are, therefore, deemed to be patentably distinct over Roberts for at least those reasons discussed above with respect to independent claims 1 and 19.

Claims 10-14, 16, 28-32 and 34 are allowable over Roberts and Hui under 35 U.S.C. §103(a)

The Office Action states that the combination of Roberts and Hui teaches all of the elements recited in Applicants’ claims.

Roberts has been previously discussed, and does not teach or suggest the invention recited in Applicants’ amended independent claims 1 and 19.

Because Roberts does not teach or suggest the subject matter recited in Applicants’ amended independent claims 1 and 19, and because Hui does not teach or suggest any elements

of the independent claims that Roberts is missing, the addition of Hui to Roberts likewise fails to render those claims obvious.

Claims 10-14, 16, 28-32 and 34, which depend from amended independent claims 1 and 19, incorporate all of the limitations of the respective independent claim and are, therefore, deemed to be patentably distinct over the combination of Roberts and Hui for at least those reasons discussed above with respect to independent claims 1 and 19.

Claims 15 and 33 are allowable over Roberts, Hui, and Myr under 35 U.S.C. §103(a)

The Office Action states that the combination of Roberts, Hui, and Myr teaches all of the elements recited in Applicants' claims.

Roberts has been previously discussed and does not teach or suggest the invention recited in Applicants' amended independent claims 1 and 19.

Because Roberts does not teach or suggest the subject matter recited in Applicants' amended independent claims 1 and 19, and because Hui and Myr do not teach or suggest any elements of the independent claims that Roberts is missing, the addition of Hui and Myr to Roberts also fails to render claims 1 and 19 obvious.

Claims 15 and 33, which depend from amended independent claims 1 and 19, incorporate all of the limitations of the respective independent claim and are, therefore, correspondingly deemed to be patentably distinct over the combination of Roberts, Hui, and Myr for at least those reasons discussed above with respect to independent claims 1 and 19.

Claim 35 is allowable over Roberts and Shimojo under 35 U.S.C. §103(a)

The Office Action states that the combination of Roberts and Shimojo teaches all of the elements recited in Applicants' claims.

Roberts has been previously discussed and does not teach or suggest the invention recited in Applicants' amended independent claim 19.

Because Roberts does not teach or suggest the subject matter recited in Applicants' amended independent claim 19, and because Shimojo does not teach or suggest any elements of the independent claims that Roberts is missing, the addition of Shimojo to Roberts likewise fails to render claim 19 obvious.

Claim 35, which depends from amended independent claim 19, incorporates all of the limitations of independent claim 19 and is, therefore, deemed to be patentably distinct over the combination of Roberts and Shimojo for at least those reasons discussed above with respect to independent claim 19.

Conclusion

A check in the amount of \$310 is enclosed in payment of the fee required for the addition of two new claims (one of which is an independent claim in excess of three). If any additional fees or charges are required at this time in connection with the present application, it may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of all rejections, and allowance of all pending claims, in due course.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned to facilitate an early resolution of any outstanding issues.

Respectfully submitted,

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